A plane flying horizontally at an altitude of 1 mile above land and speed of 500 miles per hour passes directly over a radar station. Find the rate at which the distance from the plane to the station is increasing when it is 2 miles away from the station. Show all your work.
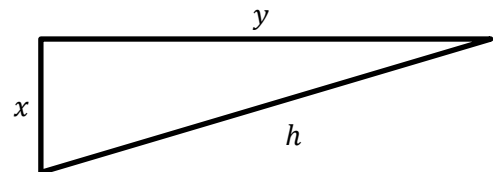
$x = 1$

$\dfrac{dx}{dt} = 0$

$y = 2$

$\dfrac{dy}{dt} = 500$

$h = \sqrt{1^2 + 2^2} = \sqrt{5}$

$\dfrac{dh}{dt} = ?$



$x^2 + y^2 = h^2$

$2x\dfrac{dx}{dt} + 2y\dfrac{dy}{dt} = 2h\dfrac{dh}{dt}$

$x\dfrac{dx}{dt} + y\dfrac{dy}{dt} = h\dfrac{dh}{dt}$

$0 + 2 \cdot 500 = \sqrt{5}\dfrac{dh}{dt}$

$\dfrac{dh}{dt} = \dfrac{2 \cdot 500}{\sqrt{5}} = \dfrac{1000}{\sqrt{5}}$

Instructor's note: Could this problem be interpreted to mean that $h = 2$, not $y = 2$? Maybe. I wouldn't take off points if that's how you interpreted it.